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Enduring Chronic Kidney Disease: An Investigation of Psychosocial Factors and Life Satisfaction in Older Adults Receiving Dialysis Treatment

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ENDURING CHRONIC KIDNEY DISEASE:
AN INVESTIGATION OF PSYCHOSOCIAL FACTORS
AND LIFE SATISFACTION IN OLDER ADULTS
RECEIVING DIALYSIS TREATMENT

An Undergraduate Honors Thesis
Submitted in Partial fulfillment of
University Honors Program Requirements
University of Nebraska-Lincoln

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August 9, 2017

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Abstract

Chronic kidney disease is a condition during which the kidneys begin to shut down and no longer filter blood efficiently. Once the disease has progressed far enough, dialysis treatments are mandatory to sustain life. To further understand how older adults receiving dialysis treatments cope with their disease, psychosocial factors were evaluated to investigate possible correlations with life satisfaction using a Life Satisfaction Index Z (LSI-Z). Expected correlations with life satisfaction were sociability, financial satisfaction, importance of spirituality, and activities of daily living scores. Interviews were conducted with 30 dialysis patients and results were analyzed using various statistical measures. Significant correlations to life satisfaction were found with the number of symptoms experienced, financial satisfaction, importance of spirituality, overall enjoyment of life score, feelings about coming to the unit, and health comparison score. Overall, patients who had more positive experiences at the dialysis unit, while also maintaining both financial and spiritual stability in their life through the transition of retirement and aging, were more likely to have greater life satisfaction. Further research is needed with a larger sample size to more deeply understand the ways in which patients cope with these changes in health and lifestyle.

**Enduring Chronic Kidney Disease:
An Investigation of Psychosocial Factors and Life Satisfaction in
Older Adults Receiving Dialysis Treatments**

Introduction and Literature Review

When investigating the life satisfaction of older adults, many factors must be considered. However, when looking at a very specific sub-set of the population, those undergoing dialysis treatments, even more factors come into play, complicating the aging process and the ability to find satisfaction in one's life. Older adults undergoing dialysis treatments must not only deal with the typical lifestyle changes of aging, but also the additional physical challenges, sociological shifts, psychological adjustments, and role reversals of enduring a disease which requires major life adjustments. A deeper look into the disease process and various methods of treatment is required to achieve a more holistic understanding of how dialysis patients may find satisfaction in their life.

The Disease Process

Chronic Kidney Disease (CKD) is a disease in which there is degeneration of the kidney and its function gradually over time. This can be caused by a variety of other underlying health problems such as diabetes mellitus, high blood pressure, cardiovascular disease, cystic kidney disease, recurring kidney stones, or unrecovered acute kidney injury (Arora, 2017). Once nephrons are damaged and lost, a reduction in the kidney's ability to filter blood will result. The remaining nephrons then begin to degenerate irreversibly, leading to a continuous decrease in the patient's glomerular filtration rate (GFR). With this decreased GFR, more fluid will be retained

in the bloodstream due to excess solutes being kept in the body. Extra fluid retained in the body can then contribute to increased risk of heart and blood vessel disease (“About Chronic Kidney Disease,” 2017). Additionally, waste products buildup in the bloodstream, which can contribute to the symptoms of CKD, including fatigue, difficulty concentrating, loss of appetite, muscle cramps, edema, and frequent need for urination (“About Chronic Kidney Disease,” 2017). However, clinical presentation of symptoms usually only occurs once the patient has reached the final stages of CKD.

With the gradual course of CKD, early detection and treatment are key in reducing the progression of this disease. An overview of the various tests used to identify the presence and severity of CKD is outlined in “About Chronic Kidney Disease,” (2017). A doctor may perform multiple tests to confirm CKD if preliminary tests of blood pressure, urine albumin, and serum creatinine levels indicate high risk for CKD. Further tests include calculating the individual’s GFR, which would indicate the specific level of filtration which is occurring, and therefore how well the kidney is functioning. Another test includes an ultrasound or CT scan to analyze the integrity of the kidneys and urinary system. Furthermore, a kidney biopsy could be done to investigate which certain type of kidney disease is present or the specific extent of the damage to the kidney.

Evaluating the stage of CKD is imperative in order to best implement a treatment plan and better educate the patient on the state of their disease. According to Arora (2017), there are many stages of CKD, all of which are dependent on the specific GFR and therefore overall kidney function of the individual (Table 1). Stages 1-3 often occur without any presence of symptoms, whereas Stages 4-5 are when patients experience clinical presentations of symptoms, such as those experienced from metabolic acidosis, abnormal salt and water imbalance, and

anemia. These include loss of lean body mass, muscle weakness, peripheral tissue edema, pulmonary edema, high blood pressure, fatigue, impaired cognitive abilities, onset of cardiovascular disease, and new development of heart failure. The kidneys are unable to properly regulate solutes in the blood, excess solutes are retained, and therefore more water is kept in the body as well. Therefore, patients with Stage 5 CKD experience peripheral tissue edema and must have fluid removed from their system during dialysis treatments. An important note is some decline in renal function is part of the normative aging process. Normal levels of decline could include up to 30-50% decreased functionality by the age of 70 in a typical person. GFR levels peak when a person is in their thirties, followed by a decline of around 1 mL/min/1.73m² each year (Arora, 2017). When normative loss of kidney function is combined with the other more serious progressions of CKD, it comprises the 1 in 10 adults living in America have some level of CKD (United States Renal Data System, 2015).

| Stage | GFR* | Description | Treatment stage |
|----------|--------------------|--|---|
| 1 | 90+ | Normal kidney function but urine findings or structural abnormalities or genetic trait point to kidney disease | Observation, control of blood pressure. More on management of Stages 1 and 2 CKD. |
| 2 | 60-89 | Mildly reduced kidney function, and other findings (as for stage 1) point to kidney disease | Observation, control of blood pressure and risk factors. More on management of Stages 1 and 2 CKD. |
| 3A 3B | 45-59 30-44 | Moderately reduced kidney function | Observation, control of blood pressure and risk factors. More on management of Stage 3 CKD. |
| 4 | 15-29 | Severely reduced kidney function | Planning for endstage renal failure. More on management of Stages 4 and 5 CKD. |
| 5 | <15 or on dialysis | Very severe, or endstage kidney failure (sometimes call established renal failure) | Treatment choices. More on management of Stages 4 and 5 CKD. |

* All GFR values are normalized to an average surface area (size) of 1.73m²

Table 1. Stages of Chronic Kidney Disease (CKD) according to GFR values and the various descriptions along with generalized treatment plans for each stage. Severity of the disease increases as the stages progress, meaning more drastic treatment plans will need to be implemented. In stage 5, patient is in kidney failure, requiring either dialysis or kidney transplantation to maintain life. Obtained from CKD Stages (2013).

Treatment Methods

An individual who has progressed to Stage 5 CKD is in kidney failure and requires more invasive treatment measures than simply monitoring and managing blood pressure and risk factors. According to “Dialysis,” (2017), dialysis is a treatment method which is used when end stage renal failure develops, which is when the kidney has a GFR less than 15. This means around 85% of the kidney’s original functional abilities have been lost. The purpose of dialysis treatments is to remove any excess waste, salt, or water so they do not buildup in the body. This also keeps chemicals in the bloodstream balanced, such as potassium, sodium, and bicarbonate, all of which play vital roles in maintaining homeostasis (“Dialysis,” 2017). For example, dialysis treatments can take off excess fluid, retained because of excess salt in the body, to help control the patient’s blood pressure. With lower blood pressure, the heart is under less strain when pumping blood throughout the body due to the decreased resistance in blood vessels. This relieves the heart from overworking to push blood through arteries.

Two types of dialysis treatments are available, hemodialysis and peritoneal dialysis. “Dialysis,” (2017) provides a holistic overview of the two types of dialysis available and how each of them works. The first type, hemodialysis, is where a patient is hooked up to an artificial kidney, otherwise known as a hemodialyzer. This requires direct access to the patient’s bloodstream, which is acquired by one of three different modalities: fistula, graft, or catheter. A fistula is surgically made through the joining of an artery to a vein, creating a larger vessel which can withstand the pressure exerted on it during dialysis treatments. Other patients will not have the adequate vessels to make a fistula. Therefore, the doctor must use another method. Instead, they can take a small soft plastic tube which joins an artery and vein, thereby creating a graft. The final modality for access to the bloodstream is called a catheter, a narrow plastic tube which

is inserted into a large vein near the patient's clavicle. The length of time for each hemodialysis treatment and the amount of fluid taken off all depend on the patient's specific level of kidney function, the amount of excess fluid in the body, how accumulated the waste products are, how large of a person is being dialyzed, and the type of artificial kidney being used. Typically, an average person will receive hemodialysis treatments for four hours, three times a week. This will occur on a Monday, Wednesday, Friday or a Tuesday, Thursday, Saturday basis around the same time of day each time.

Peritoneal dialysis is the other type, which does not require direct access to the bloodstream in the same way as hemodialysis treatments. Instead, a surgeon inserts a catheter into the patient's abdomen. During the treatment, fluid fills the peritoneal cavity, otherwise known as the abdominal cavity. The patient's blood remains in their respective blood vessels, however, the excess waste and fluid is drawn out of the blood and into the dialysate fluid in the cavity. Within peritoneal dialysis, there are two different types, continuous ambulatory peritoneal dialysis (CAPD) and automated peritoneal dialysis (APD). With CAPD, no machines are required. The patient performs the treatment themselves by inserting a bag of the dialysate fluid into the peritoneal cavity via the catheter in place. The fluid will remain in the abdominal cavity for around four hours before being drained and thrown away. These treatments are done continuously throughout the day and while the individual performs regular day-to-day activities. The second type of peritoneal dialysis is APD, which is usually done in the patient's home using a cyclor machine. Each cycle occurs for one-and-a-half hours and are performed throughout the night while the individual is sleeping ("Dialysis," 2017).

Life Satisfaction Measurements

Life satisfaction is a broad and abstract term, but ways have been developed so it can be quantitatively measured. Adams (1969) reviewed the history behind social scales, stating it most notably began with Cvan, Burgess, Havighurst, and Goldhamer in 1949 with their 56-item scale of attitude while adjusting to aging. Then, an index was proposed by Neugarten, Havighurst, and Tobin in 1961, the Life Satisfaction Index A (LSI-A), which was released after a thorough 5-year study of normatively healthy individuals in an urban setting of Kansas City. The LSI-A (Table 2) is composed of 20 items, which results in four or five items representing each of five major components associated with overall life satisfaction. The five components observed were, “Zest for life opposed to apathy; resolution and fortitude as opposed to resignation; congruence between desired and achieved goals; high physical, psychological and social self-concept; and a happy, optimistic mood tone” (Adams, 1969). According to Redmond’s dissertation, each item was answered by the patient with either an “agree” or “disagree,” with an answer of “unsure” denoting the same score as a negative response (Redmond, 1990). However, further studies indicated it was only moderately successful in measuring life satisfaction and should only be used with group measurements of people over the age of 65 (Redmond, 1990).

| Item | Agree | Disagree | Unsure |
|--|-------|----------|--------|
| 1) As I grow older, things seem better than I thought they would. | 1 | 0 | 0 |
| 2) I have gotten more of the breaks in life than most of the people I know. | 1 | 0 | 0 |
| 3) This is the dreariest time of my life. | 0 | 1 | 0 |
| 4) I am just as happy as when I was younger. | 1 | 0 | 0 |
| 5) My life could be happier than it is now. | 0 | 1 | 0 |
| 6) These are the best years of my life. | 1 | 0 | 0 |
| 7) Most things I do are boring or monotonous. | 0 | 1 | 0 |
| 8) I expect some interesting and pleasant things to happen to me in the future. | 1 | 0 | 0 |
| 9) The things I do are as interesting to me as they ever were. | 1 | 0 | 0 |
| 10) I feel old and somewhat tired. | 0 | 1 | 0 |
| 11) I feel my age, but it does not bother me. | 1 | 0 | 0 |
| 12) As I look back on my life, I am fairly well satisfied. | 1 | 0 | 0 |
| 13) I would not change the past even if I could. | 1 | 0 | 0 |
| 14) Compared to other people my age, I've made a lot of foolish decisions in my life. | 0 | 1 | 0 |
| 15) Compared to other people my age, I make a good appearance. | 1 | 0 | 0 |
| 16) I have made plans for things I'll be doing a month or a year from now. | 1 | 0 | 0 |
| 17) When I think back over my life, I didn't get most of the important things I wanted. | 0 | 1 | 0 |
| 18) Compared to other people, I get down in the dumps too often. | 0 | 1 | 0 |
| 19) I've gotten pretty much what I expected out of life. | 1 | 0 | 0 |
| 20) In spite of what some people say, the lot of the average man is getting worse, not better. | 0 | 1 | 0 |

Table 2. LSI-A items and their respective response codes dependent on whether the item has a positive connotation. Unsure responses are given the same coding as a negative response. Therefore, the most positive responses will generate the highest overall score total. Obtained from Redmond (1990).

Upon re-evaluation of the LSI-A, a study done by Wood, Wylie, and Sheafor in 1966 produced similar results, but they suggested the index questionnaire be reduced from its original 20 to only 13 questions, thereby creating the LSI-Z (Adams, 1969). The purpose of the LSI-Z is, “To measure the psychological well-being of the elderly,” (Corcoran & Fischer, 2013). The questionnaire can be given to the subject of interest either orally or in writing. Furthermore, Wood, Wylie, and Sheafor believed the scoring system include a two-point response system which would include “uncertain” responses in addition to the simple “agree” or “disagree,” giving the scoring system a 0, 1, or 2 as its code (Adams, 1969). This would allow for more accurate responses and a greater possible total score, with a higher score denoting a higher life satisfaction. Some questions are posed in a positive connotation, where “agree” would denote a 2, whereas other questions had a more negative connotation, and an “agree” would denote a 0. With this system, the highest score, and life satisfaction, is produced from answering “agree” to positively connotated items, and “disagree” to negatively connotated items. To verify the reliability of the Life Satisfaction Index, Wallace and Wheeler (2002) compared 157 journal articles, which included a total of 34 samples. The analysis done provided evidence for adequate reliability of LSI scores across many different sample characteristics. However, results must be interpreted with caution, especially given small sample sizes (Wallace & Wheeler, 2002).

Review of Life Satisfaction Studies

Many studies have been performed investigating life satisfaction in older adults and attempting to find correlating factors to overall life satisfaction. Notably, Lyyra, Tormakangas, Read, Rantanen, and Berg (2006) investigated life satisfaction using an OCTO-Twin study database of 320 individuals who were 80-year-old Swedish Twins over the course of a 10-year follow-up period. Using a modified LSI-Z, utilizing a 5-point scale, where 1 = strongly disagree to 5 = strongly agree, they implemented factor analysis methods which revealed three factors present (Table 3).

Summary of Factor Loadings for Promax Three-Factor Solution for the LSI-Z Items and Factor Correlations.

| Item or Correlation | Factor loading | | | |
|--|----------------|-------------|-------------|-------|
| | 1 | 2 | 3 | h^2 |
| 1. As I grow older, things seem better than I thought they would. | 0.36 | 0.13 | 0.33 | 0.55 |
| 2. I have gotten more breaks in life than most of the people I know. | 0.05 | -0.14 | 0.62 | 0.63 |
| 3. This is the dreariest time of my life. | 0.24 | 0.63 | -0.11 | 0.47 |
| 4. I am just as happy as when I was younger. | 0.78 | -0.00 | 0.13 | 0.27 |
| 5. These are the best years of my life. | 0.83 | 0.00 | -0.07 | 0.38 |
| 6. Most of the things I do are boring or monotonous. | 0.11 | 0.88 | -0.09 | 0.19 |
| 7. The things I do are as interesting to me as they ever were. | 0.36 | 0.31 | 0.08 | 0.63 |
| 8. As I look back on my life, I am fairly well satisfied. | 0.05 | 0.00 | 0.76 | 0.38 |
| 9. I have made plans for things I'll be doing a month or a year from now. | 0.29 | 0.01 | 0.17 | 0.83 |
| 10. When I think back over my life, I didn't get most of the important things I wanted. | -0.20 | 0.24 | 0.32 | 0.86 |
| 11. Compared with other people, I get down in the dumps too often. | -0.07 | 0.72 | 0.04 | 0.50 |
| 12. I've gotten pretty much what I expected out of life. | 0.01 | -0.09 | 0.76 | 0.45 |
| 13. In spite of what people say, the lot of the average person is getting worse, not better. | -0.15 | 0.36 | 0.05 | 0.89 |
| Factor correlations | | | | |
| Factor 1 | — | | | |
| Factor 2 | 0.45 | — | | |
| Factor 3 | 0.52 | 0.35 | — | |

Notes: The highest factor loading for each item is shown in boldface type. Community = h^2 . Items 3, 6, 10, 11, and 13 were coded in reverse for analysis.

Table 3. LSI-Z items and factor analysis for each item. The analysis revealed three factors: Zest, Mood Tone, and Congruence. Zest represented Items 1, 4, 5, 7 and 9. Mood Tone represented Items 3, 6, 11, and 13). Congruence represented Items 2, 8, 10, and 12. Obtained from Lyyra, Tormakangas, Read, Rantanen, & Berg (2006).

The first, Zest, meaning the subject showed positively worded satisfaction with their present life, had the highest explanatory power, and represented Items 1, 4, 5, 7, and 9 of the LSI-Z. The second factor identified was Mood Tone, meaning the subject showed a negatively worded present life satisfaction, and was represented by Items 3, 6, 11, and 13. The final factor was Congruence, meaning the subject found satisfaction in their past and it held up to their

expectations, and was represented by Items 2, 8, 10, and 12. The factors Zest, and Mood Tone represented how satisfied the individual was with their life currently, whereas Congruence represented satisfaction with their past life. Additionally, Lyyra et al. (2006) investigated correlations with mortality, revealing those who were in the lowest quartile of factors regarding life satisfaction with their life at present had nearly double the risk for mortality compared to the individuals who scored in the highest quartile. However, satisfaction with one's past showed no true association with mortality. Lyyra et al. (2006) also evaluated the number of serious illnesses, sociodemographic characteristics, depressive symptoms using a Center of Epidemiologic Studies-Depressive scale (CES-D), and physical functioning, which measured overall balance, upper body strength, flexibility, and dexterity. Furthermore, the study investigated cognitive functioning and frequency of social contacts, which was scored on a 7-step rating scale (from 1 = never, 2 = hardly ever, 3 = yearly, 4 = monthly, 5 = weekly, 6 = more than weekly, 7 = daily). Results revealed social support was beneficial for not only survival, but also positively correlated with life satisfaction. Additionally, marital status as well as socioeconomic status were found to correlate strongly with life satisfaction and mortality rates. What did not correlate with life satisfaction was the number of serious diseases, even though it was a strong predictor of mortality.

A different study done by Baiyewu and Jegede (1992) researched 945 people over the age of 60 in rural and urban South-Western Nigeria. The reliability and validity for LSI-Z scores were maintained even after translation into another language. After scores for their LSI-Z were calculated, they were found to correlate with self-assessed health, loneliness, sex, where females had higher scores than men, and location.

Focusing instead on an older sector of the population, Berg, Hassing, McClearn, and Johansson (2006), studied 315 subjects aged between 80-98 years old, where the mean age was 83 years, and 66% of their subjects were women. The research concluded that LSI-Z scores correlated to, “Demographics, depression, locus of control, cognitive function, functional capacity, self-rated overall health, medically based health, and social network,” (Berg et al., 2006). Additionally, men who were widowers had significantly lower life satisfaction scores. Their results emphasized the importance for other studies to analyze a broader context of psychosocial variables separately for men and women.

A special subset, hemodialysis patients, were at the forefront of a study by Patel, Shah, Peterson, and Kimmel (2002). They evaluated 53 hemodialysis patients for psychosocial variables in addition to various medical variables. These included perceived importance of faith or spirituality, religious involvement through attendance of religious services, the Beck Depression Inventory, the Multidimensional Scale of Perceived Social Support, and many others. Results included the conclusion that, “Men had higher depression scores, perceived lower social support, and higher religious involvement scores than women,” (Patel et al., 2002). Furthermore, those who had higher scores of spirituality or religiosity also correlated to increased social support and higher quality of life in addition to a less negative perception of their illness. The researchers recognized, “Religious beliefs are related to perception of depression, illness effects, social support, and quality of life independently of medical aspect of illness,” (Patel et al., 2002). Having a strong sense of religion may be a coping mechanism of patients who are on hemodialysis treatments, and this relationship should be investigated further.

Another look at hemodialysis patients was done by Kimmel, Emont, Newman, Danko, and Moss (2003). They studied 165 hemodialysis patients from three different locations using

Quality of Life (QOL) questionnaires including Satisfaction With Life Scale (SWLS) and the McGill QOL (MQOL) scale. Kimmel et al. (2003) discovered patients who experienced symptoms, especially pain, in addition to psychosocial and spiritual factors correlated with overall quality of life.

Moving toward a more financial and economic stance, Chatfield (1977) investigated the importance of economic and sociological factors to life satisfaction of the elderly population. Chatfield took a random sample of 2,500 individuals who were recently retired from the Columbus, Ohio area. LSI-Z analysis indicated those who were recently retired had lower LSI-Z scores, but after the initial 12 months post-retirement, no statistical differences were found. This means the subjects adjusted to overcome the initial drop in life satisfaction over time. This initial drop in life satisfaction with retirement had more to do with the loss of income than from the loss of their role as a productive worker in society. Additionally, the higher life satisfaction found when living in a family setting seems to be more from the higher income availability due to the living arrangements.

Lastly, to evaluate how well patients handled their dialysis treatments and how well they adjusted to their new lifestyle, Westlie, Umen, Nestrud, and Kjellstrand (1984) conducted a study with 157 patients over the age of 70. The purpose of the study was to determine if treatment for people over 75 years old should be dialysis candidates. First, Westlie et al. investigated various risk factors, such as diabetes mellitus, arteriosclerotic heart disease, cerebrovascular accidents, chronic obstructive pulmonary disease, peripheral vascular disease, and many more. After the conclusion of the study, they found the highest frequency of risk factor was arteriosclerotic heart disease at 35%. The most common diagnoses were nephrosclerosis (32.1%), chronic glomerulonephritis (11.3%), and diabetes mellitus (11.3%)

among the population of hemodialysis patients. Additionally, dialysis symptoms and episodes were observed during the last 14 days of dialysis treatments which includes headaches, arrhythmia, vomiting, cramps, and hypotension. A great majority of the patients lived in their own home (86.8%), whereas living in a family member's home (3.8%) and living in a nursing home (9.4%) were significantly lower in frequency. When patients were asked if they were satisfied with their social contact at home with family, 85.4% said yes, while only 83% were satisfied with their friend social contact. Furthermore, yearly income levels were noted, finding that in-center patients had higher income levels than in-home patients. Many of the patients were seen to be fairly active, stating activities outdoors (83%), participating in church activities (39.6%), having active hobbies (56.6%), and cooked their own meals (41.5%). To gauge the patient's overall enjoyment of life, they were asked to rate their enjoyment on a scale of 0 – 6, with the largest majorities found answering 6 (67.9%), 4 (15.1%), and 3 (7.5%). However, when asked to rate their feelings about coming to the unit on the same scale of 0 – 6, the most common responses were 3 (28.3%), 4 (22.6%), and 5 (17%). To measure their perceptions of their own health compared to others their age, a scale of 1 – 5 was used, where 1 = your health is much worse than others to 5 = your health is much better than others. The perceived health scores fell mainly as 3 (37.7%), 2 (24.5%), and 4 (18.9%). Westlie et al. (1984) concluded that in-home patients had slightly higher life satisfaction scores than unit patients, but not at significant levels. Fewer complaints of dialysis symptoms were also found among in-home patients. However, many of the in-home and unit patients had high enjoyment of life and thought their health fared considerably well compared to others their age. Therefore, those who are over 75 years old would be suitable candidates for dialysis according to the results of the study.

After compiling and analyzing the literature available and pertinent to this study, it's hypothesized that LSI-Z scores will correlate most strongly with sociability in older adults. This branches from the mindset that with more social support and activity, dialysis patients will maintain a sense of purpose in their life. Additionally, financial status and spirituality are expected to correlate with life satisfaction according to similar results from recent studies previously mentioned. Lastly, lower activities of daily living (ADL) scores are expected to correlate with higher life satisfaction because the patient will be less limited in their lifestyle and socialization.

Materials and Methods

Population Selection

The population for the study was selected randomly from a list of eligible patients at the Dialysis Center of Lincoln who fit the criteria of being over the age of 50 and having enough mental capacity to handle their own affairs. The age parameter maintains an older population for the data analyzed, modeling after other studies noted previously which also analyzed older populations when evaluating LSI-Z. Additionally, the mental capacity parameter will help maintain the integrity of the study because those interviewed will be able to understand and answer questions accurately, whereas someone with dementia may skew the data. Patients were selected from both the Monday, Wednesday, Friday and the Tuesday, Thursday, Saturday rotations in both the first and second shift of patients. The first shift arrived around 5:30 am and finished around 10 am. The second shift arrived at 10:30 am and stayed until around 2 pm. A total of 30 individuals were selected and interviewed for the study.

Interview

The interview questionnaire (Forms 1, 2, & 3) was developed based on parameters investigated in other studies. Each patient gave their name to ensure repetition of patients did not occur, however, after the completion of data collection, each patient was assigned a number in the order they were interviewed to maintain each subject's privacy. The questionnaire was given orally and patient responses were recorded accordingly on the interview sheets. With regards to the Life Satisfaction Index Z, Items 3, 6, 10, 11, and 13 were given reversed scores to maintain positive responses with highest score outcomes. Therefore, the highest total LSI-Z

score still represents the greatest life satisfaction. Each interview took anywhere from 10 to 45 minutes to complete depending on the patient and their depth of answers or contemplation.

Patient Interview

Name:

Gender:

Age:

How long HD (months):

Other health issues: hypertension, high cholesterol, arthritis, diabetes, heart disease, osteoporosis, lung disease, liver disease, seizures, emotional/psychological problems

Other: _____

Symptoms: In the last month have you experienced...

- headache, arrhythmia, vomiting, cramps, hypotension, other _____ during treatments

Marital Status: Married / Widowed / Single / Divorced

Living Situation: Home alone, Home with others, Independent Center, Assisted Living, Nursing Home

Financial: 1 Not satisfied at all, 2 Somewhat unsatisfied, 3 Satisfied, 4 Fairly Satisfied, 5 Very Satisfied

Activity when off Dialysis

- Being outdoors, participate in church activities, active hobbies, cook own meals, other: _____

Spirituality: How much do you value your religious beliefs/spirituality?

- 1 Not important at all, 2 Somewhat unimportant, 3 Neutral, 4 Somewhat Valued, 5 Very Important

Socialization Outside of Dialysis

- Family: (in-person, call, letters, _____)
 - 0 Never, 1 Once a month, 2 Twice a month, 3 Three times a month, 4 Once a week, 5 Greater than once a week
- Satisfied with Family Socialization:
 - 1 Not satisfied at all, 2 Somewhat unsatisfied, 3 Satisfied, 4 Fairly Satisfied, 5 Very Satisfied
- Friends: (in-person, call, letters, _____)
 - 0 Never, 1 Once a month, 2 Twice a month, 3 Three times a month, 4 Once a week, 5 Greater than once a week
- Satisfied with Friend Socialization:
 - 1 Not satisfied at all, 2 Somewhat unsatisfied, 3 Satisfied, 4 Fairly Satisfied, 5 Very Satisfied

Enjoyment of Life

- 1 No enjoyment whatsoever, 2 Somewhat unenjoyable, 3 Satisfied, 4 Fairly enjoyable, 5 Very enjoyable

Feelings about coming to the unit

- 1 Extremely dislike, 2 Somewhat dislike, 3 Neutral, 4 Somewhat enjoy, 5 Very much enjoy

How would you rate your health compared to others your age?

- 1 Much worse, 2 Somewhat worse, 3 About the same, 4 Somewhat better, 5 Much better

Form 1. Page 1 of patient interview sheet, which was filled out upon oral interview conducted with each hemodialysis patient. Options for each section were circled by the interviewer. Notes were added in blanks when patient response did not fit options listed. HD = hemodialysis.

Activities of Daily Living Assessment**Name:****Rate 0-4****0 Independence, 1 Need Supervision, 2 Need limited Assistance, 3 Need excessive assistance/Weight bearing assistance, 4 Total Dependence**

Eating:

Dressing:

Toileting:

Maintaining personal hygiene:

Walking:

Chair to Standing:

Changing Positions in Bed:

Total ADL Score:

Form 2. Page 2 of patient interview sheet. Activities of daily living (ADL) were assessed and given a score from 0 – 4 given the level of assistance required to perform each given ADL. Scores from each of the seven ADL's were totaled and listed at the bottom.

Life Satisfaction Index – Z**Name:****1. As I grow older, things seem better than I thought they would.**

1 Strongly Disagree 2 Slightly Disagree 3 Neutral 4 Slightly Agree 5 Strongly Agree

2. I have gotten more breaks in life than most of the people I know.

1 Strongly Disagree 2 Slightly Disagree 3 Neutral 4 Slightly Agree 5 Strongly Agree

3. This is the dreariest time of my life.

5 Strongly Disagree 4 Slightly Disagree 3 Neutral 2 Slightly Agree 1 Strongly Agree

4. I am just as happy as when I was younger.

1 Strongly Disagree 2 Slightly Disagree 3 Neutral 4 Slightly Agree 5 Strongly Agree

5. These are the best years of my life.

1 Strongly Disagree 2 Slightly Disagree 3 Neutral 4 Slightly Agree 5 Strongly Agree

6. Most of the things I do are boring or monotonous.

5 Strongly Disagree 4 Slightly Disagree 3 Neutral 2 Slightly Agree 1 Strongly Agree

7. The things I do are as interesting to me as they ever were.

1 Strongly Disagree 2 Slightly Disagree 3 Neutral 4 Slightly Agree 5 Strongly Agree

8. As I look back on my life, I am fairly well satisfied.

1 Strongly Disagree 2 Slightly Disagree 3 Neutral 4 Slightly Agree 5 Strongly Agree

9. I have made plans for things I'll be doing a month or a year from now.

1 Strongly Disagree 2 Slightly Disagree 3 Neutral 4 Slightly Agree 5 Strongly Agree

10. When I think back over my life, I didn't get most of the important things I wanted.

5 Strongly Disagree 4 Slightly Disagree 3 Neutral 2 Slightly Agree 1 Strongly Agree

11. Compared with other people, I get down in the dumps too often.

5 Strongly Disagree 4 Slightly Disagree 3 Neutral 2 Slightly Agree 1 Strongly Agree

12. I've gotten pretty much what I expected out of life.

1 Strongly Disagree 2 Slightly Disagree 3 Neutral 4 Slightly Agree 5 Strongly Agree

13. In spite of what people say, the lot of the average person is getting worse, not better.

5 Strongly Disagree 4 Slightly Disagree 3 Neutral 2 Slightly Agree 1 Strongly Agree

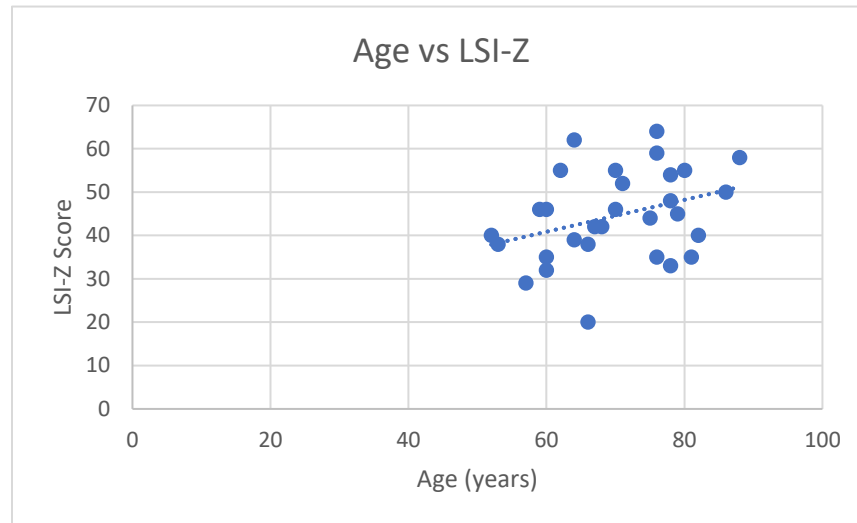
Form 3. Page 3 of patient interview sheet, which is the LSI-Z assessment. Patients were asked to rate each statement on a scale of strongly disagree to strongly agree and scores were assessed accordingly. Each item's score was added to create total LSI-Z score.

Results

Each parameter of the interview sheet was compared to the respective LSI-Z score for analysis of correlation. The study of 30 individuals consisted of 20 males and 10 females. An independent t-test with two means was conducted to see if any correlation between gender and LSI-Z was present. Evaluation of a relationship between gender and LSI-Z score was done with an independent t-test with two means. The sample population was composed of 20 males and 10 females. There was not a significant difference in the scores for males ($M = 44.25$, $SD = 9.22$) and females ($M = 45.2$, $SD = 13.14$); $t(28) = -0.23$, $p = 0.407$. Therefore, no true correlation is observed between gender and LSI-Z score. It is worth noting that the LSI-Z scores for men averaged 44.25, and similarly, females averaged 45.2. This suggests each gender was normally distributed around the same mean LSI-Z score despite fewer females being included in the study than men. Similarities in LSI-Z scores across the genders makes comparisons more reliable even though the sample of females was smaller.

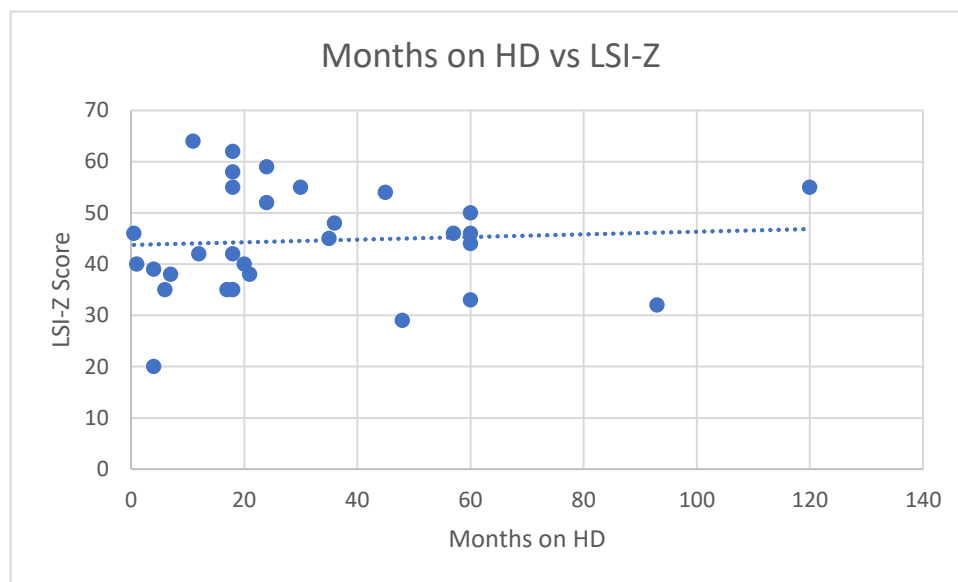
Many of the comparisons between items of the interview and everyone's LSI-Z scores were made using a Pearson correlation coefficient. This test is used when comparing the relationship between two normally distributed interval variables. The Pearson correlation coefficient measure the linear correlation, or how well two variables correlate with one another in a linear manner. This indicates the direction of correlation, either positive or negative. A value of +1 or -1 indicates a perfect linear relationship, with all data points lying exactly on the line of correlation. Additionally, R^2 values can be calculated to see the amount of variability which is explained by the proposed model for the goodness of fit line.

A Pearson correlation coefficient was computed to assess the relationship between age and LSI-Z score. Results indicate no significant correlation between the two variables, $r = 0.342$, $n = 30$, $p = 0.064$. A scatterplot summarizes the results (Graph 1).



Graph 1. Age of subject versus LSI-Z score distribution. No significant correlation noted.

Another Pearson correlation coefficient was used to evaluate the relationship between how long each patient had been on hemodialysis treatments and their respective LSI-Z scores. There was no significant relationship between length of time receiving treatments and life satisfaction, $r = 0.069$, $n = 30$, $p = 0.716$. A scatterplot below summarizes the results (Graph 2).



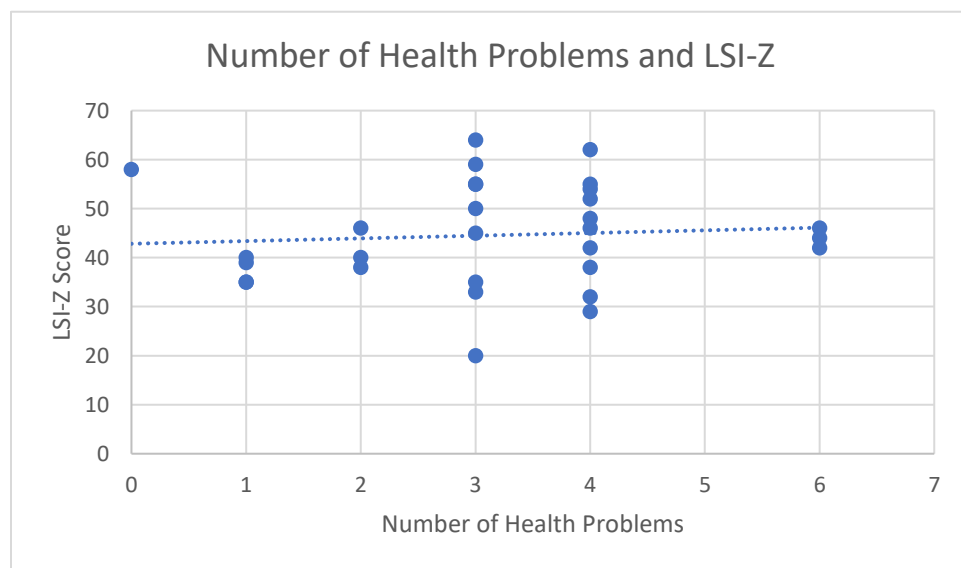
Graph 2. Months on hemodialysis (HD) treatments and LSI-Z scores. No significant correlation noted.

When looking at the health problems section of the interview, patients were asked item-by-item if they had been diagnosed with any of the conditions. Of the ones pre-listed on the interview sheet, hypertension, high cholesterol, arthritis, diabetes osteoporosis, heart disease, lung disease, liver disease, seizures, and emotional or psychological problems, a list of frequencies was created. A note, however, is that osteoporosis and arthritis were lumped together considering many patients answered yes to both, not seeming to understand any discernable difference between the two. Additionally, whenever a subject stated they had diabetes, it was always Type 2. If the patient claimed they had lung problems, it was always because they had been diagnosed with Chronic Obstructive Pulmonary Disease (COPD). Distribution results of health problems across patients studied are shown below (Table 4). To further analyze the possible relationship, everyone's total number of health problems stated from the list in the interview sheet was compared to LSI-Z scores. Using a Pearson correlation

coefficient test, the results were not significant between the two variables, $r = 0.078$, $n = 30$, $p = 0.682$. Scatterplot of the data are provided below (Graph 3).

| Health Problem | Number of Patients Affected | Frequency |
|--|-----------------------------|-----------|
| Hypertension (high blood pressure) | 21 | 70% |
| Hyperlipidemia (high cholesterol) | 10 | 33.33% |
| Arthritis | 17 | 56.67% |
| Type 2 Diabetes | 17 | 56.67% |
| Heart Disease | 19 | 63.33% |
| Chronic Obstructive Pulmonary Disease (COPD) | 6 | 20% |
| Liver Disease | 2 | 6.67% |
| Seizures | 2 | 6.67% |
| Emotional/Psychological Problems | 1 | 3.33% |

Table 4. Evaluation of various health problems and their frequency across the sample population studied.

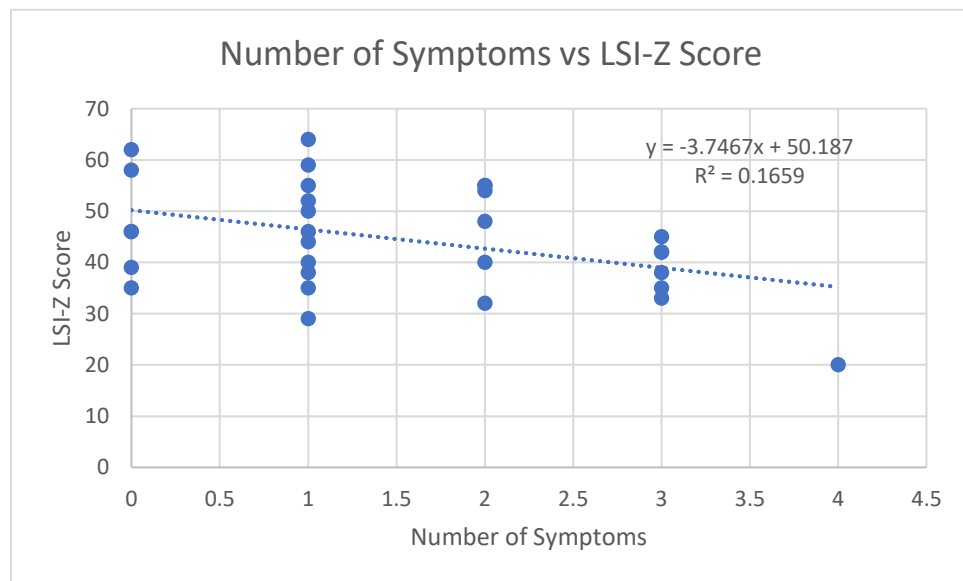


Graph 3. Scatterplot comparing number of health problems for each patient and their respective LSI-Z scores. No significance was noted.

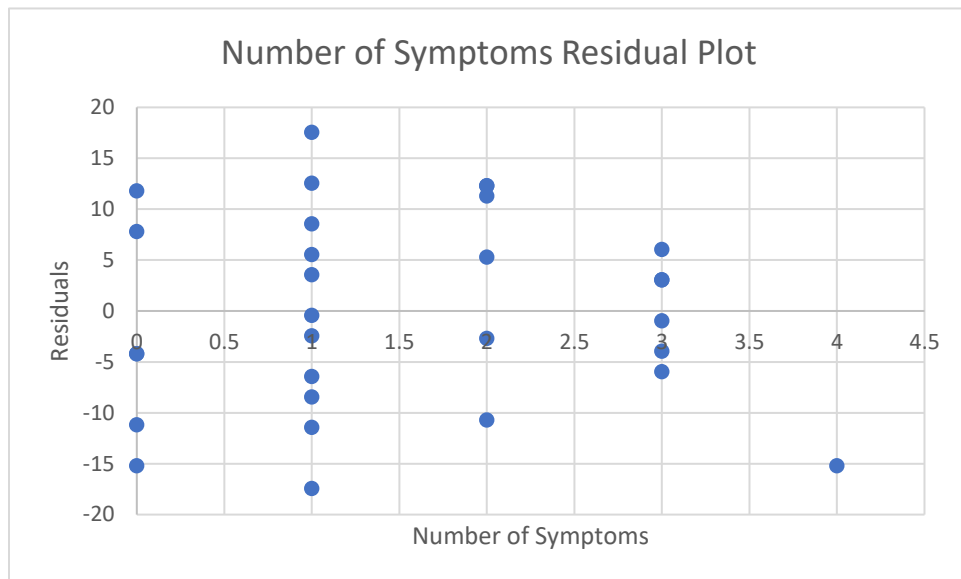
A similar method was used when evaluating the symptoms patients experienced in the last month. Patients were told to list which symptoms they had experienced within the last month of their dialysis treatments, which included headaches, arrhythmia, vomiting, cramps, and hypotension. The number of patients who experienced each symptom and the frequency of each symptom across the studied population and are displayed below (Table 5). A comparison between the number of symptoms experienced and LSI-Z scores was done with a Pearson correlation coefficient. The test showed statistical significance between the number of symptoms recently experienced and the patient's LSI-Z score, $r = -0.407$, $n = 30$, $p = 0.026$. This displays a negatively correlated relationship, meaning as the number of symptoms increases, then the LSI-Z score decreases, and therefore life satisfaction decreases (Graph 4). To confirm proper fit, residuals were plotted (Graph 5). This shows a slight narrowing, which was mostly due to the small sample size. A Root Mean Square (RMS) value tells us the average amplitude of the residuals by squaring the values, averaging the squares, and taking the square root. This is done to allow the inclusion of originally negative values, but after squaring them, negative values are essentially made positive so the average of residuals is not zero. The RMS was calculated for number of symptoms, $RMS = 9.393$, meaning the average amplitude of residuals was around 9 LSI-Z points, showing quite a bit of spread.

| Symptom | Number of Patients Affected | Frequency |
|-------------|-----------------------------|-----------|
| Headache | 8 | 26.67% |
| Arrhythmia | 4 | 13.33% |
| Vomiting | 3 | 10% |
| Cramps | 17 | 56.67% |
| Hypotension | 13 | 43.33% |

Table 5. Evaluation of various symptoms and their frequency across the population studied.



Graph 4. Scatterplot displaying negative correlation between the number of symptoms experienced by the patient in the last month of treatments and each subject's LSI-Z score.



Graph 5. Residual plot evaluating the number of symptoms experienced by patients. A slight narrowing is observed, which is mostly due to the small population size. Heteroscedasticity, or unequal variability across the residual values is observed, but not significantly. RMS = 9.393.

Evaluation of marital status and LSI-Z score required a One-Way ANOVA test, which is used to compare multiple categorical variables with an interval variable. After using a One-Way ANOVA to compare marital status and LSI-Z, it produced a non-significant result at $p < 0.05$ level for single, married, widowed, and divorced [$F(3, 26) = 0.089$, $p = 0.965$]. A summary of the calculation results is given below (Table 6).

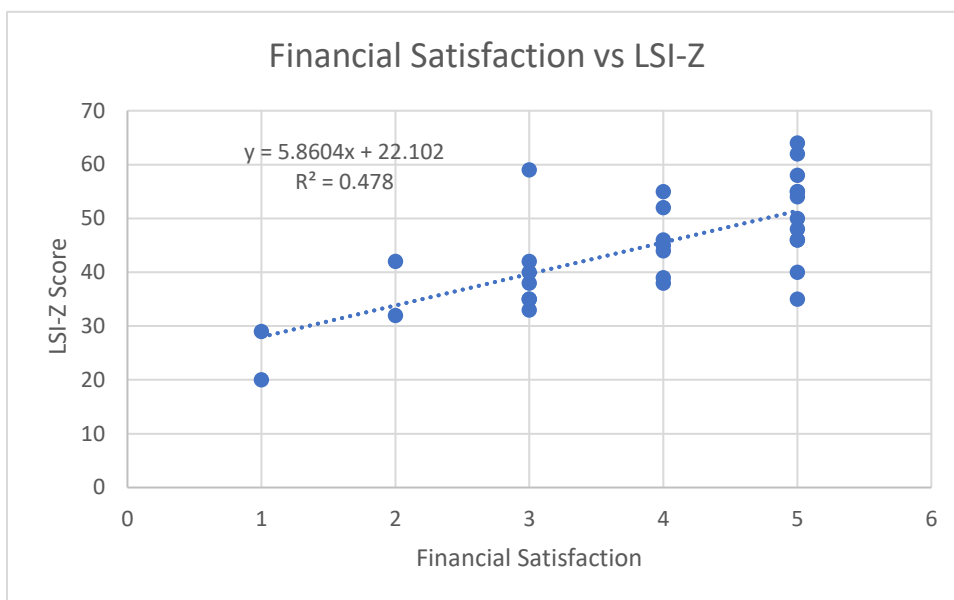
| Summary of Data | | | | | | |
|-----------------|-------------------|---------|--------|---------|---|---------|
| | <i>Treatments</i> | | | | | |
| | 1 | 2 | 3 | 4 | 5 | Total |
| N | 16 | 6 | 4 | 4 | | 30 |
| ΣX | 727 | 264 | 170 | 176 | | 1337 |
| Mean | 45.4375 | 44 | 42.5 | 44 | | 44.5667 |
| ΣX^2 | 34427 | 12630 | 7500 | 8202 | | 62759 |
| Std.Dev. | 9.64 | 14.2408 | 9.5743 | 12.3558 | | 10.4607 |

| Result Details | | | | |
|--------------------|-----------|-----------|-----------|---------------|
| <i>Source</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | |
| Between-treatments | 32.4292 | 3 | 10.8097 | $F = 0.08948$ |
| Within-treatments | 3140.9375 | 26 | 120.8053 | |
| Total | 3173.3667 | 29 | | |

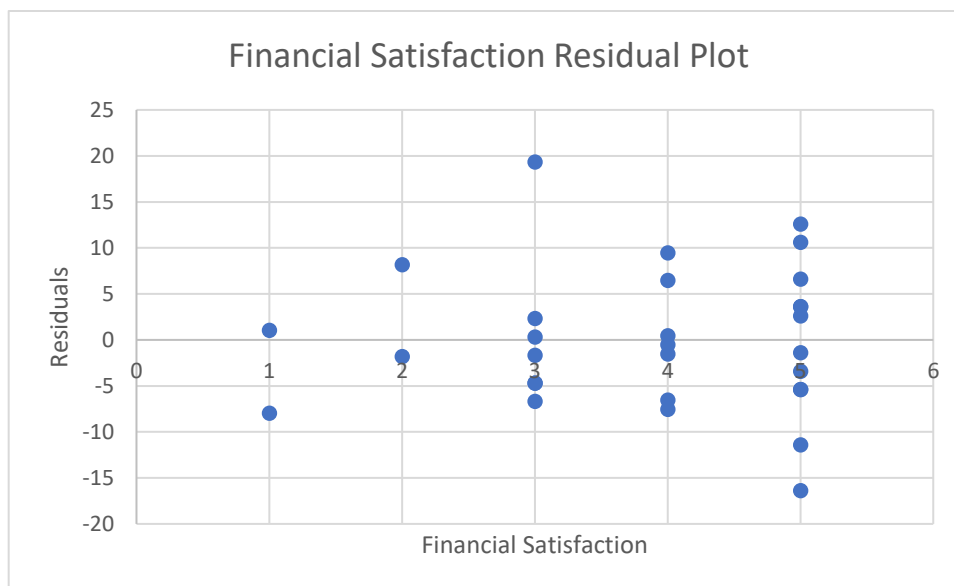
Table 6. Summary of One-Way ANOVA result which analyzes marital status and LSI-Z trend. Results generated and obtained from “One-Way ANOVA Calculator” (2017).

An unpaired, independent t-test, was used to compare the living situation and LSI-Z scores, only looking at living home alone and living at home with others since the other living options did not contain enough people to make accurate comparisons. The independent-samples t-test was conducted to compare living at home alone and home with others against LSI-Z scores. There was not a significant difference in the scores for living at home alone ($M = 45.88$, $SD = 10.89$) and living at home with others ($M = 43.74$, $SD = 10.65$); $t(25) = 0.473$, $p = 0.640$.

A Pearson correlation coefficient was calculated to analyze correlations between financial satisfaction and LSI-Z scores. There was a significant correlation between the two variables, $r = 0.691$, $n = 30$, $p = 2.3 \times 10^{-5}$, with the significance level set at $p < 0.05$. A scatterplot displays the results (Graph 6). Since the correlation was significant, further analysis of residuals is required (Graph 7). The scatterplot of residuals shows no specific trend, meaning the original plot of correlation was an appropriate fit to the line modeled originally. A Root Mean Square (RMS) value of 7.431 shows slightly less spread than that from the number of symptoms evaluation.



Graph 6. Scatterplot evaluating correlation between financial satisfaction and LSI-Z. A statistically significant positive correlation was noted. Goodness of Fit Line equation and R^2 values displayed on graph.



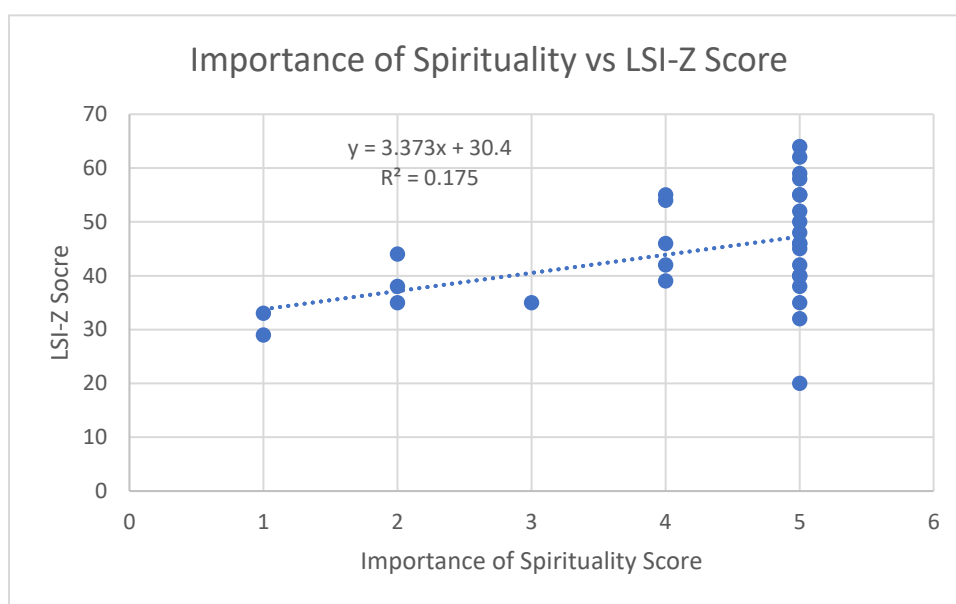
Graph 7. Residual Plot for Financial Satisfaction. Plot reveals no true trends, meaning the original graph's line was a good fit for the data. $RMS = 7.431$.

The interview item for which patients described their activity when off dialysis, many listed being outdoors or doing some hobbies inside, such as reading, crocheting, painting, etc. No one category was displayed significantly more than the others. One individual claimed they had no activities, and would not list even a single activity when prompted to list other options than the ones provided on the interview sheet. However, this individual's LSI-Z was 52, well above the average of 44.57. Therefore, there is no reasonable correlation between the number of activities listed and life satisfaction.

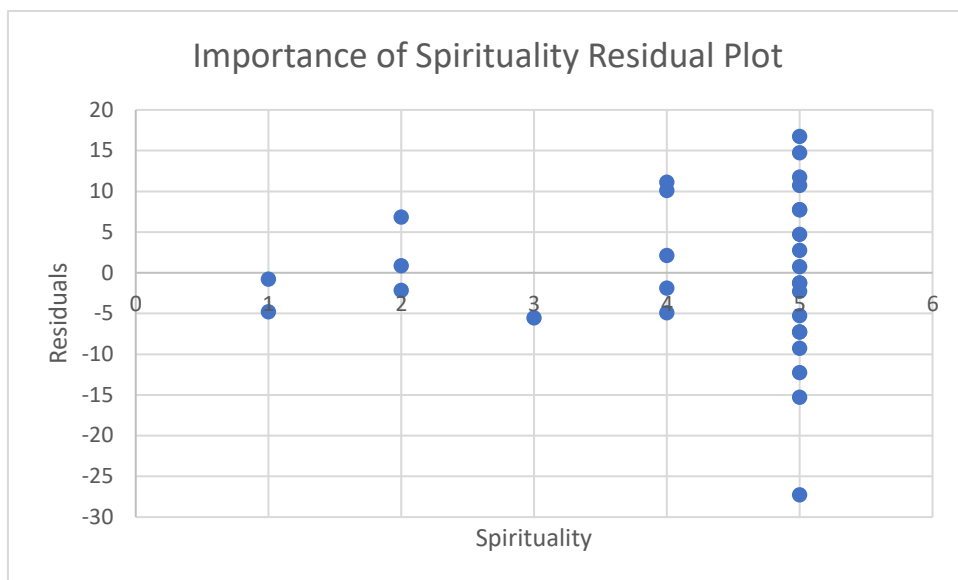
A Pearson correlation coefficient was calculated to compare importance of spirituality or religion scores to LSI-Z score. Upon evaluation, there is a statistically significant correlation between spirituality and life satisfaction, $r = 0.418$, $n = 30$, $p = 0.021$. A scatterplot is provided below showing the positive correlation between these variables (Graph 8). It is noteworthy, however, that the individuals with the lowest and highest LSI-Z score both rated spirituality as a 5. Further analysis was done through the evaluation of the residual plot (Graph 9).

Heteroscedasticity was observed, meaning as the score for spirituality increased, the residuals

also increased. This was most likely created due to the small population size which skewed the data to be non-normal in distribution. Since their options were only 1 – 5, many different types of individuals answered the same score. Additionally, this doesn't automatically create problems since this observed residual characteristic will only possibly sway significance if it is on the border, near $p = 0.05$. The $p = 0.021$ for spirituality is enough under the cutoff of significance that we still recognize this as a correlating factor with LSI-Z scores. RMS of spirituality is 9.342, showing large spread of residual values, mostly from the wide range of LSI-Z scores associated with very high spirituality.



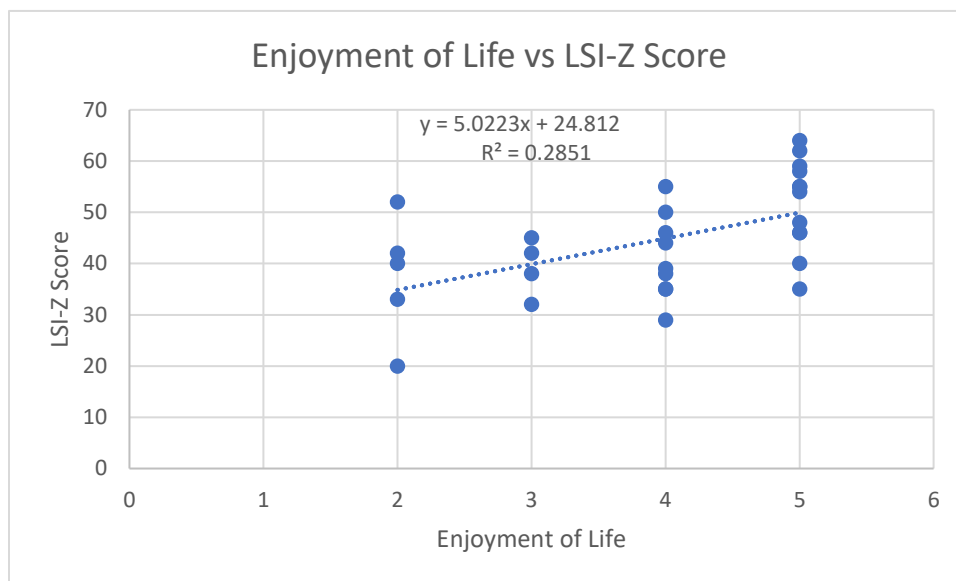
Graph 8. Scatterplot showing the statistically significant positive correlation between importance of spirituality or religion with LSI-Z score.



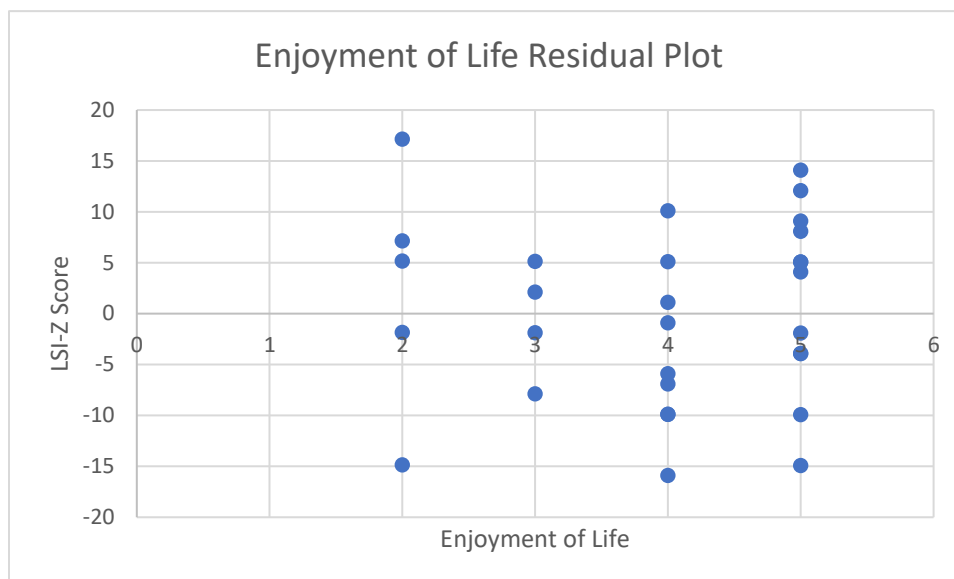
Graph 9. Residual plot evaluating the importance of spirituality shows heteroscedasticity, which means that as the value for spirituality gets larger, the residuals also become larger. This is amplified because of the scoring format, where many people answered the same score for a wide range of LSI-Z scores. Statistical significance between spirituality and LSI-Z score is still maintained. RMS = 9.342.

Sociability was evaluated through items during the interview which addressed the amount of interaction and overall satisfaction regarding these interactions with both family members and friends. Frequency of interaction was scored from 0 – 5, ranging from never to greater than once a week. Satisfaction with socialization was on a scale from 1 = Not Satisfied at All to 5 = Very Satisfied. In evaluating each of these parameters, a Pearson correlation coefficient was calculated. None of the parameters regarding sociability were statistically significant. Frequency of family socialization, $r = 0.154$, $n = 30$, $p = 0.417$, satisfaction with family socialization, $r = 0.022$, $n = 30$, $p = 0.909$, frequency of friend socialization, $r = 0.161$, $n = 30$, $p = 0.394$, and satisfaction with friend socialization, $r = 0.336$, $n = 30$, $p = 0.069$, were all above the cutoff of $p = 0.05$ for significance. The means for satisfaction of socialization with family (4.2) was nearly the same as satisfaction with friends (4.23), even though the frequency of family socialization (4.33), was much higher than mean friend socialization (3).

A broad parameter, overall enjoyment of life, was evaluated using a Pearson Correlation Coefficient. The test examining the relationship between overall enjoyment of life and LSI-Z score was statistically significant, $r = 0.5339$, $n = 30$, $p = 0.002$. This indicates additional validating evidence that the LSI-Z accurately measures an individual's life satisfaction. A scatterplot with the correlational trend is shown below (Graph 10). RMS of 8.696 shows spread of residuals, however the spread is more even across all values given the more scattered nature of the residual plot and normal distribution of answers.

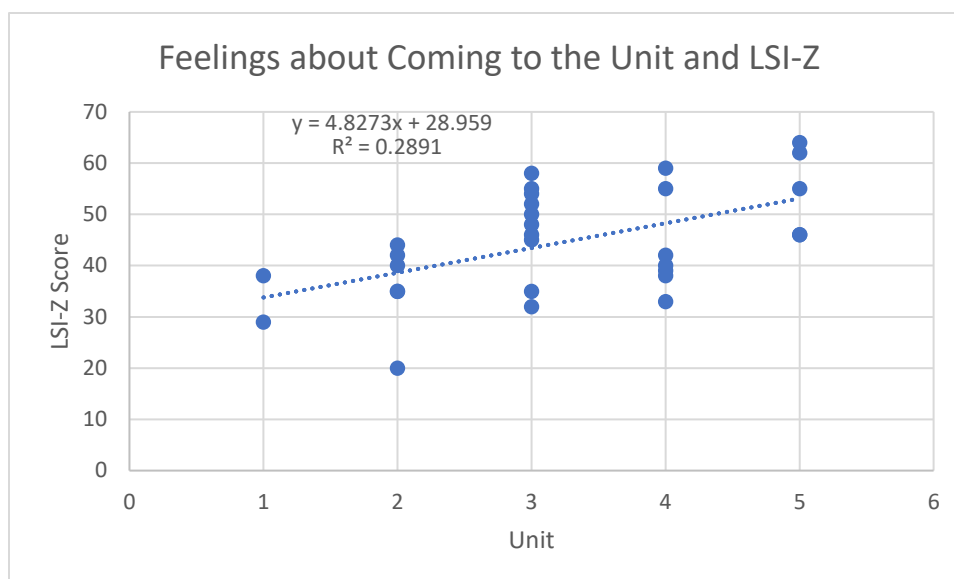


Graph 10. Scatterplot depicting the statistically significant correlation between an individual's rating for overall enjoyment of life and their respective LSI-Z score.

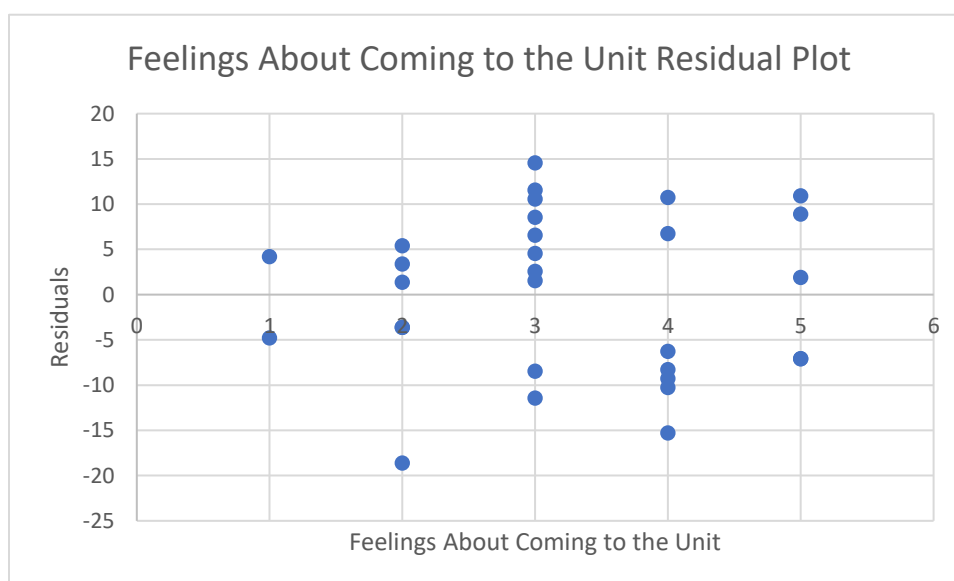


Graph 11. Enjoyment of life residual plot shows no true trends, indicating a strong original model of correlation between enjoyment of life scores and LSI-Z scores. RMS = 8.696.

Evaluation of each subject's feelings about coming to the dialysis unit compared to their LSI-Z score was done through a Pearson correlation coefficient. This test showed a statistically significant correlation between these two variables, $r = 0.534$, $n = 30$, $p = 0.002$. A scatterplot displays the trend and is a visual representation of the correlation present (Graph 12). Further evaluation was done by looking at the residuals plot displaying feelings about coming to the dialysis unit. Upon reviewing the residuals plot (Graph 13), no true trends are present, meaning the original model evaluating the correlation was appropriate. RMS value of 8.672 indicates spread, but evenly spaced, as indicated by the residual plot.



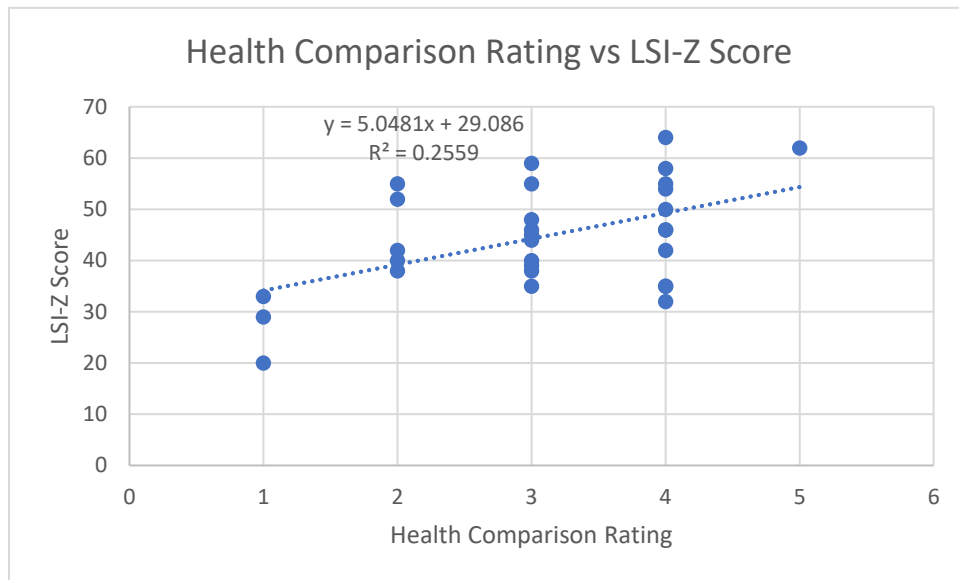
Graph 12. Scatterplot displaying statistically significant correlation between the patient's feelings about coming to the dialysis unit and LSI-Z scores.



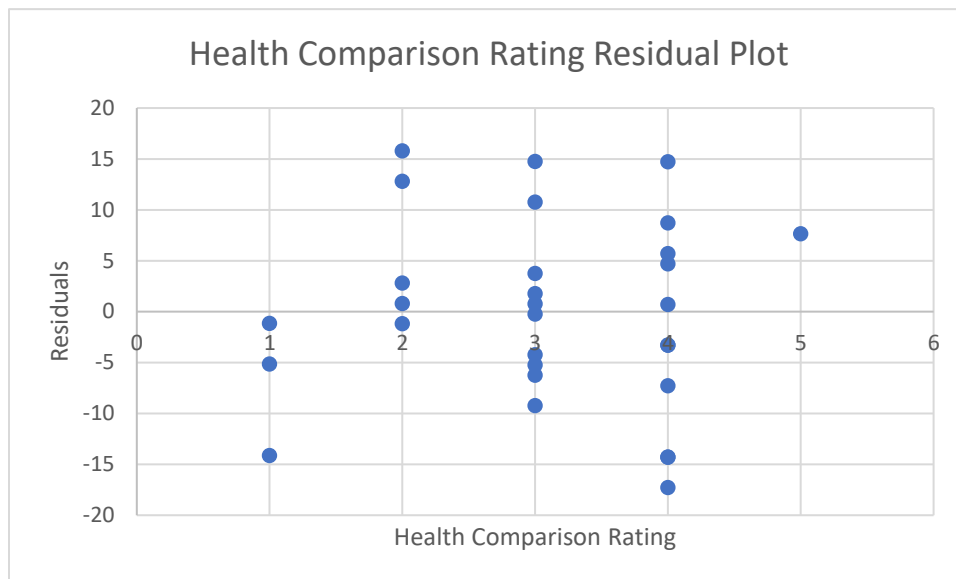
Graph 13. Residual plot of feelings about coming to the unit. No true trends seen, indicating a strong original model between feelings about coming to the unit and LSI-Z scores. RMS = 8.672.

Next, dialysis patients were asked to rate their health compared to other people their age on a scale from 1 = They think they are doing much worse than others to 5 = They think they are doing much better than others. A Pearson correlation coefficient was calculated, showing a statistically significant correlation between ratings of health compared to others and LSI-Z

scores, $r = 0.506$, $n = 30$, $p = 0.004$. A scatterplot below displays the linear relationship present (Graph 14). Evaluation of residuals plot (Graph 15) reveals no true trends, meaning the original linear model was a good fit. $RMS = 8.872$, showing decent amount of spread, but evenly distributed across all values. No heteroscedasticity is observed because a wider range of responses were given across the Health Comparison Rating scale. Variation is fairly even throughout all the values.

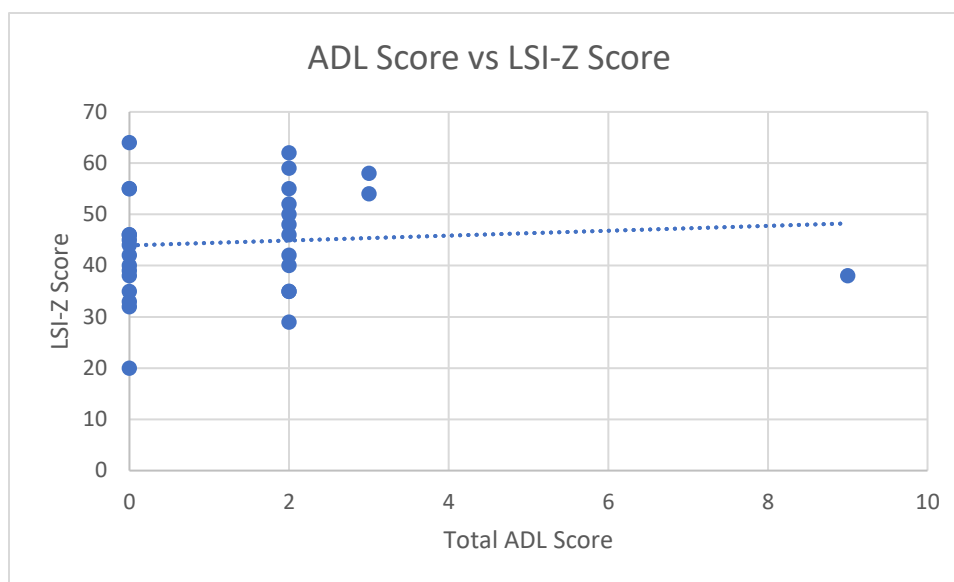


Graph 14. Scatterplot displaying statistically significant correlation between Health Comparison Rating and LSI-Z Score.



Graph 15. Residual plot of Health Comparison Ratings reveals no true trends. Original model maintains goodness of fit. RMS = 8.872.

Upon evaluation of ADL scores, total ADL scores were calculated from each of the seven categories of activities: eating, dressing, toileting, maintaining personal hygiene, walking, chair to standing position, and changing positions in bed. Most subjects interviewed had an ADL score of either 0, meaning they were completely independent, or 2, because they used a walker or cane. Only three of the patients interviewed had ADL scores which deviated, two of which had a score of 3, and one person who scored 9. The person with the highest ADL score was an amputee who was also overweight, requiring bath aides and some help around the house because of mobility issues. Upon a Pearson correlation coefficient test, no statistical significance was found between ADL score and LSI-Z score, $r = 0.083$, $n = 30$, $p = 0.663$.



Graph 16. Scatterplot displaying the non-significant correlation between total ADL score and LSI-Z score. This could be due to the lack of variation in scores due to the small sample size.

Discussion

The purpose of this study was to investigate the various ways in which factors may correlate or contribute to the overall life satisfaction of older adults receiving dialysis treatments. Only some of the hypothesized variables showed statistically significant values of correlation, however, additional factors were also discovered.

Evaluating the results of the study, significant correlations were found with the number of symptoms a patient experienced, financial satisfaction, importance of their spirituality, overall enjoyment of life score, feelings about coming to the unit, and personal health rating score compared to the health of others their own age. Each correlation was determined by having a p value of less than 0.05 in their respective statistical test. Residual plots were also evaluated with each model which displayed significance to confirm proper original statistical fits for each model.

While the number of health problems did not correlate strongly enough to show significance, the number of symptoms experienced did. The patients were asked if they had experienced a list of symptoms in the last month of dialysis treatments. These symptoms of headaches, arrhythmia, vomiting, cramps, and hypotension can all lead to great discomfort and unease for the patient, only escalating their distress of coming to the unit for treatment. However, the number of health problems could remain higher without affecting overall life satisfaction if they were well managed, and therefore less symptomatic in the patient's daily life. Additionally, the health problems asked in the interview were directed toward both the aging process in general and typical health problems experienced with dialysis treatments and chronic kidney disease. These included hypertension, hyperlipidemia, arthritis, type 2 diabetes, heart disease, congestive heart failure, COPD, liver disease, seizures, and emotional or psychological

distress. All the health problems listed are capable of being well-maintained and under control, leading to a more normal lifestyle than if they were untreated.

Overall, the level of comfort during dialysis treatments was of the utmost importance. If the patient experienced a high level of pain or uncomfortable symptoms while receiving treatments, they ultimately had a more negative view of coming to the dialysis unit. This was also observed through a significant correlation between the patients' feelings regarding dialysis treatments and their life satisfaction scores. Patients who experienced fewer negative symptoms with their treatments also had higher scores of enjoyment when asked how they felt about coming into the dialysis unit, both of which showed an association with higher life satisfaction. Therefore, overall comfort when attending dialysis treatments can make a substantial impact on the patient's overall perspective and attitude when it comes to receiving their treatments.

Patients who are more positive with regards to their dialysis treatments are already setting up a more uplifting mentality. Treatments are viewed to be a necessity and patients recognize they feel better after the fact. Patients also noted how they always felt worst after their two days off dialysis over the weekend. Thus, patients with a more positive outlook viewed their chronic kidney disease as well-maintained and under control given they continued their regular schedule of dialysis treatments. With this mentality, they were more likely to rate their health higher when comparing to other adults their same age, again, correlating with higher life satisfaction. They recognized nearly everyone begins to have some sort of health problem or restrictions as they age, and this was simply their routine upkeep. With regular dialysis treatments, patients reported they felt well enough to partake in the activities they enjoy most, such as cooking, gardening, spending time with their grandkids, etc., and the only real limitation in their life was the time-consuming nature of the treatments themselves. However, those who reported more

limited activities and thought their health was worse than their peers were typically patients who, again, experienced more life-limiting symptoms. This is further evidence that having a more overall comfortable experience with dialysis and positive mindset contributes to greater satisfaction in life.

Another factor observed was the significant correlation between satisfaction with life and finances. The question was posed on a 1-5 scale of how satisfied patients were with their current financial status. In other studies, people were asked their annual or monthly income and placed into a bracket according to the specific amount. Instead, a satisfaction evaluation was done because many older adults don't know their exact income, assets, or are retired and living off social security payments. Additionally, the question being posed from a satisfaction standpoint was less invasive to the patients' privacy. This question also essentially assesses their financial stability. Older adults who are experiencing health problems often have large medical bills to pay and may not be working, which can place a strain on their finances. With satisfactory finances in place, patients are more likely to afford and adhere to medications, which could also contribute to better overall health. Although not specifically seen in this study, some dialysis patients in Lincoln have reported they are so financially unstable that they live out of their car with no permanent residence. This leads to a whole new problem, infection. With minimal hygiene practices in place, catheter ports become more susceptible to infection due to unclean washing and being exposed to a more confined environment. Physicians, social workers, and nurses must be aware of the patients' living situation to properly educate and provide resources in hopes of preventing infection among these individuals. Additionally, financial stability and satisfaction means one less burden for the patient to bear on top of their health problems, resulting in less overall stress and greater life satisfaction.

As seen in other studies, spirituality is another key player when it comes to having greater life satisfaction. Older adults naturally begin thinking about their mortality, which can lead to a greater emphasis on staying in touch with their religious organization or personal spirituality. Not every person is necessarily active with a specific faith or church, which is more often associated with the word “religion.” However, “spirituality” is a more inclusive term which encompasses personal spiritual beliefs even if it’s not with an established organization or traditions. Dialysis center patients were asked to rate how important their religious beliefs or spirituality was to them on a scale of 1-5. Those who had higher spirituality scores tended to have higher LSI-Z scores. This stems from the mentality of patients having a purpose or believing in something greater than this world. Patients who are no longer able to do the things they could when they were younger, or seem to have lost a sense of purpose through retirement, can find ways to fill these voids with the inclusion of spiritual beliefs. Some stated they were not angry at their disease or medical situation because it was part of God’s plan, found strength in their faith, and continued to feel supported by their church. Others stated their faith was enhanced after experiencing their intense grief from receiving a diagnosis or starting dialysis treatments. Life, as some said, seems more meaningful, fulfilled, and happier when they focus on their spirituality. Whether they were actively participating in church activities, social circles, or had a more individual spiritual lifestyle, they were participating in something which gave them hope, comfort, purpose, and support. Therefore, patients who saw great importance in their spirituality thought their life was more fulfilling and satisfying.

Lastly, analyzing LSI-Z scores requires asking thirteen questions which are framed in both a positive and negative way to measure an individual’s overall life satisfaction score. However, the same results can essentially be obtained from asking one simple question of what

they would rate their overall enjoyment of life on a scale from 1-5. Patients subconsciously compile their satisfaction on all the factors in their life, average them together, and report a score which is nearly congruent to the life satisfaction index score. This means that even with all the research and time used to set up the life satisfaction indices, one question could possibly compile all the necessary information to give an accurate rating of their life satisfaction. Further studies should be done to investigate the validity of such a test in which only the one question is posed versus the entire index for life satisfaction. Additional information gathered could lead to simpler assessments of patients and their overall enjoyment of life without the more time-consuming methods in place currently.

Overall, further investigation should be done to verify if the trends seen in this study hold true for dialysis patients in a larger pool of subjects. The population for this study, 30 patients, was smaller than is typically desired for human psychosocial studies. However, the smaller population evaluated for this study did incorporate a spread of ages, gender, living situation, marital status, while many of the patients still had similar health problems due to their common diagnosis of chronic kidney disease. With more researching resources available, a larger study could be conducted across multiple dialysis centers to obtain more information regarding correlations with life satisfaction in this specific population of older adults. It is, however, pertinent that interviews be conducted in a similar manner across all the subjects and personal information is maintained private according to HIPAA regulations.

Acknowledgements

I would first like to thank Mary Lou Buss for her support and guidance. I never would have imagined my high school internship adviser would one day become not only my college professor, but also my research adviser for my Honors Thesis at the University of Nebraska-Lincoln. My goal of performing human-based research and having a special interaction with patients was made possible through your continued encouragement of my desire to learn more about patients and one day joining the medical field.

Thank you to Dr. Leslie Spry, the Medical Director for the Dialysis Center, for reviewing my research plan and allowing me to interview patients. You have been such an influential member of the dialysis community in Lincoln and your expertise was much appreciated.

Also, I would like to thank the nursing staff at the Dialysis Center of Lincoln for their kind words and help with patients being interviewed. The care you show each patient is evident and you created a welcoming environment for my research study.

Lastly, I could not have done any of this without the willing participation of the patients at the Dialysis Center. It was an absolute joy speaking with each of you. I not only gained valuable research information, but I learned a little bit about each of you as an individual. Thank you for sharing your wisdom, perspectives, and stories with me.

Citation List

- About Chronic Kidney Disease. (2017). Retrieved July 24, 2017, from <https://www.kidney.org/atoz/content/about-chronic-kidney-disease>
- Adams, D. L., MA. (1969). Analysis of a Life Satisfaction Index. *Journal of Gerontology*, 24(4), 470-474. doi:10.1093/geronj/24.4.470
- Arora, P., MD. (2017, May 02). Chronic Kidney Disease (V. Batuman MD, FASN, Ed.). Retrieved July 25, 2017, from <http://emedicine.medscape.com/article/238798-overview>
- Baiyewu, O., & Jegede, R. O. (1992). Life Satisfaction in Elderly Nigerians: Reliability and Factor Composition of the Life Satisfaction Index. *Z. Age and Ageing*, 21(4), 256-261. doi:10.1093/ageing/21.4.256
- Berg, A. I., Hassing, L. B., McClearn, G. E., & Johansson, B. (2006). What matters for life satisfaction in the oldest-old? *Aging & Mental Health*, 10(3), 257-264. doi:10.1080/13607860500409435
- Chatfield, W. F. (1977). Economic and Sociological Factors Influencing Life Satisfaction of the Aged. *Journal of Gerontology*, 32(5), 593-599. doi:10.1093/geronj/32.5.593
- CKD Stages [Renal Association]. (2013). Retrieved July 25, 2017, from <http://www.renal.org/information-resources/the-uk-ekkd-guide/ckd-stages#sthash.tg0GTyzp.dpbs>
- Corcoran, K., & Fischer, J. (2013). *Measures for Clinical Practice and Research* (5th ed., Vol. 2). New York, New York: Oxford Univeristy Press.
- Dialysis. (2017). Retrieved July 24, 2017, from <https://www.kidney.org/atoz/content/dialysisinfo>
- Kimmel, P. L., MD, Emont, S. L., PhD, Newmann, J. M., PhD, Danko, H., RN, CNN, & Moss, A. H., MD. (2003). ESRD patient quality of life: symptoms, spiritual beliefs,

- psychosocial factors, and ethnicity. *American Journal of Kidney Diseases*, 42(4), 713-721. doi:10.1016/s0272-6386(03)00907-7
- Lyyra, T., Tormakangas, T. M., Read, S., Rantanen, T., & Berg, S. (2006). Satisfaction With Present Life Predicts Survival in Octogenarians. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 61(6). doi:10.1093/geronb/61.6.p319
- One-Way ANOVA Calculator. (n.d.). Retrieved July 27, 2017, from <http://www.socscistatistics.com/tests/anova/default2.aspx>
- Patel, S. S., Shah, V. S., Peterson, R. A., & Kimmel, P. L. (2002). Psychosocial variables, quality of life, and religious beliefs in ESRD patients treated with hemodialysis. *American Journal of Kidney Diseases*, 40(5), 1013-1022. doi:10.1053/ajkd.2002.36336
- Redmond, Cleve, "The multidimensional structure of the Life Satisfaction Index A and its application in research on aging " (1990). *Retrospective Theses and Dissertations*. Paper 9884.
- United States Renal Data System. (2015). Chapter 1: CKD in the Genral Population. *2015 USRDS annual data report: Epidemiology of Kidney Disease in the United States*. Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases.
- Wallace, K. A., & Wheeler, A. J. (2002). Reliability Generalization of the Life Satisfaction Index. *Educational and Psychological Measurement*, 62(4), 674-684. doi:10.1177/0013164402062004009
- Westlie, L., Umen, A., Nestrud, S., & Kjellstrand, C. M. (1984). Mortality, morbidity, and life satisfaction in the very old dialysis patient. *Transactions-American Society for Artificial Internal Organs*, 30, 21.